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## NEW AMERICAN MYXOMYCETES.

GEO. A. REX, M. D.

**Physarum nucleatum.**

Sporangia exactly spherical, about .5 mm. in diameter, stipitate, erect or slightly nodding; wall of sporangium membranaceous, rupturing irregularly, generally thickly studded with rounded, white lime granules.

Stipes from 1 to 1.5 mm. in height, subulate, yellowish-white, longitudinally rugose. Columella wanting; capillitium composed of a very closely meshed net of delicate snow-white tubules with minute round or rounded white granules of lime at the intersections. In the center of the capillitium net, there is usually a conspicuous mass of lime generally forming a shining white ball, not continuous with the stipe, although sometimes having a prolongation downward toward it, this ball being rarely supplanted by a closely compacted mass of irregular lime granules holding the same relative position. Spores 6-7  $\mu$ . in diam., brown violet in color; episporos delicately spinulose, although apparently smooth when examined under medium power lenses.

Fairmount Park, Philadelphia.

This species most nearly resembles in appearance and habit of growth *Phys. Petersii* B. & C. var. *Farlowi* Rost., but may be distinguished from it by the absence of a columella, by the central ball of lime and the very small rounded lime granules in the meshes of the capillitium. Exceptionally the lime granules of the sporangium wall are sparse or absent entirely, in which case the wall has a silvery or coppery metallic lustre.

**Physarum penetrale.**

Sporangia erect, stipitate, generally ellipsoidal or pyriform, rarely globose, from .3  $\times$  .5 mm. to .5  $\times$  .7 mm. in diameter. Sporangium walls membranaceous, semitransparent, studded sparsely with rounded, pale yellow or yellow-gray lime granules, rupturing to the base into from two to four segments. Stipes very variable, from .5 to 2 mm. in height, slender, subulate, longitudinally rugose, flattened laterally toward the base, translucent, dull red or golden red in color.

Columella formed by a continuation of the stipe penetrating the sporangium to about four-fifths its height, reddish-yellow in color, slender, tapering to a wedge-shaped end. Capillitium composed of

a closely and irregularly meshed reticulation of delicate white tubules with a variable number of obtuse angled or irregularly rounded, pale yellow granules of lime at the intersections. Spores 6-6.5  $\mu$ . in diameter, brown in mass, delicately spinulose, although apparently smooth under lenses of medium power.

Fairmount Park, Phila., Adirondack Mts., N. Y., White Mts., N. H., Rangeley, Maine and Ohio (A. P. Morgan).

The leading characteristic of this species is its columella, which is longer than that of any described *Physarum*. It is a true columella and not a mere aggregation or columella-like mass of lime granules, such as may be found in many species of *Physarum*.

**Chondrioderma aculeatum.**

Sporangia sessile, lenticular or hemispherical, flattened above, and concave, sometimes umbilicate, below. Walls of sporangia double, separated by a well marked interspace; external wall dusky or yellowish-white, papyraceous, wrinkled when dry, ultimately cracking and rupturing irregularly; internal wall thin, membranaceous, semi-transparent, grayish, rarely iridescent.

Columella irregular, sometimes small and hardly evident; upper surface rugose with ridges or thickenings, the edges of which bristle with well marked spine-like processes.

Columella and inner surface of base of sporangium uniformly nut brown in color. Capillitium pure white, scanty, composed of simple, sparsely branched sinuous threads attached to the spines of the columella in a slightly fasciculate manner, and radiating thence to the inner wall of the sporangium.

Spores dark violet, 12-13  $\mu$ . in diameter, spinulose under medium powers.

Bar Harbor, Me.; Adirondack Mts., N. Y.

This species is a true *Diderma* analogous to *C. difforme* and *C. testaceum* but is sufficiently distinguished by its tough parchment-like external wall and its spinose columella.

**Stemonitis Webberi.**

Sporangia gregarious, standing on a common hypothallus, erect, stipitate, more or less cylindrical, obtuse, sometimes slightly clavate, sometimes recurved at the apex, 10-12 mm. in height including stipes.

Stipes black, shining, about 2 mm. high. Columella central, running nearly to the apex where it subdivides into several branches.

Capillitium composed of widely separated radial threads of a brown violet color, originating by triangular plasmodic expansions at the point of attachment to the columella, connecting with each other by lateral branches given off close to the columella, often forming a second series of expansions at the junctions, then running to the surface where they branch and form a delicate surface net-work of a pale brown color with large irregularly oblong meshes, varying from 40 to 160  $\mu$ . in length. Terminal and recurved portion of surface net-work, frequently composed of thickened threads which unite with the terminal branches of the columella forming an irregular plexus.

Spores 7–8  $\mu$ . in diameter, ferruginous color in mass, with thick, delicately spinulose episporos which are apparently smooth under lenses of medium power.

Manhattan, Kansas, H. J. Webber.

This is a well marked species with distinctive characters. The meshes of the surface net-work are larger than those of any species yet described. It is still further distinguished from *Stemonitis splendens* Rost. or any allied species by its ferruginous colored spores and pale, delicate surface capillitium.

***Stemonitis Virginiensis.***

Sporangia erect, stipitate, gregarious, growing on a common hypothallus, usually found in small isolated clusters, occasionally, however, in continuous masses, from 3–3.5 mm. in height, including stipes, about .5 mm. in width, cylindrical or elongated ovate, rounded at apex or terminating in a short blunt point, and often umbilicate at the base.

Stipes averaging 1.3 mm. in length, black and shining. Columella central, running to the apex where it joins the capillitium by several terminal branches.

Capillitium composed of an intricate net-work of numerous slender, dark brown, flexuous threads originating in the columella and joined together by numerous arcuate lateral branches, terminating in a surface net parallel to the walls of the sporangium; meshes of the surface net irregular in shape, 6–12  $\mu$ . in diameter, often evanescent in the upper part of the sporangium, breaking away by the dispersion of the spores. Spores umber brown in mass, 5.5 to 6.5  $\mu$ . in diameter, episporos conspicuously reticulated with about 10–12 reticulations to the hemisphere.

Allegheny Mts., Virginia.

This species resembles in its general appearance, *Comatricha typhina* Roth. The threads composing the meshes of the surface net often have dark bulbous thickenings of about twice their usual diameter, occurring irregularly in their course or at their intersections. The spores are beautifully and clearly sculptured with deep reticulations, which can be determined readily with a lens of medium power. The species may be distinguished from *S. dictyospora*, by its more strongly marked spore, the smaller size of its sporangia and its comatricha-like habit of growth.

***Stemonitis nigrescens.***

Sporangia gregarious, standing on a common hypothallus, erect, more or less cylindrical, entire height with stipe about 4 mm.

Stipes .5 mm. long, black.

Columella central, running to apex of sporangium, then subdividing into several branches. Capillitium, violet black in the center, arcuate, flexuous, forming a loose meshed central reticulation which becomes dark violet as it nears the surface. Surface net-work, complete and characteristic of the genus only on the lower third of the sporangium, being usually irregular in the middle portion and evanescent or falling away with the spores toward the apex. When perfect, the meshes of the surface net vary from 12–20  $\mu$ . in diameter.

Spores 8  $\mu$ . in diameter, nearly black in mass, deep blackish violet singly under a microscope. Epispores thick, sharply and prominently spinulose with a quite moderate amplification.

Fairmount Park, Philadelphia.

This species is noteworthy for its comparatively short stipes, its very spinulose spores and its black or nearly black color, the slight violet tint being only apparent on close inspection, especially in fresh, moist specimens. It is a species which illustrates the difficulty of determination in a case where the diagnostic characters of two adjoining genera apparently blend together. Although characters of both *Stemonitis* and *Comatricha* are to be found in it, yet those of the former genus seem to predominate and the species is, therefore, so referred. Such borderland species as this and *Comatricha subcæspitosa* Pk., seem to point to the necessity for a revision of the boundary lines between the two genera, which, in these examples, are practically narrowed down to the question of the degree of the parallelism of the surface net to the walls of the sporangium.

***Comatricha irregularis.***

Sporangia gregarious, standing on a common hypothallus, semi-erect, drooping, total height with stipes 3·5 to 7 mm. usually about 4 mm., very irregular and variable in outline and size, either irregularly cylindrical distorted by one or more nodulose swellings, or irregularly elongated conical or ovate, or cylindrical and flattened laterally with longitudinal grooves on the flattened sides, or occasionally regularly cylindrical.

Stipes black, slender, usually equalling the length of the sporangia but varying from one-half to twice their length.

Columella central, slender, flexuous, running to the apex where it branches and joins the capillitium. Capillitium composed of arcuate threads which radiate from the columella and are joined together forming a central irregular reticulation of large, coarse loops or meshes, at first brown, then becoming paler and more slender as they approach the surface, finally forming an irregular exterior reticulation of delicate, pure white or colorless threads which terminate on the surface everywhere in free ends.

Peripheral capillitium very evanescent.

Spores dark brown in mass, from 7-8  $\mu$ . in diameter. Epispores thick, warted, with dark rounded warts.

Fairmount Park, Philadelphia; New Jersey (Ellis); Ohio (Morgan).

Although this species has the general habit of growth of *Stemonitis*, I have not been able, in any of the specimens which I have examined, to detect even a fragment of the characteristic surface net-work of that genus.

The peripheral branches of the capillitium are pure white, giving under a reflector a frosted or hoary appearance strongly contrasting with the darker threads beneath. They are exceedingly delicate, breaking away easily with the spores which seem to have more tendency to agglutination than those of other species.

***Cribraria violacea.***

Sporangia stipitate, erect or slightly nodding, total height with stipe .5 mm. to 1 mm., dark violet with a metallic sheen, ellipsoidal or ovoid, rarely globose. Stipes .3 to .5 mm. high, slender, subulate, longitudinally rugose, dark blackish-violet becoming black at the base.

Sporangium wall formed of a pale violet membrane, thickly studded with dark violet plasmodic granules, externally wrinkled, entire for

two-thirds or more of its basal portion forming a permanent receptacle, the upper third being in effect lacerated into irregularly shaped fragments, which are joined by a few simple threads forming a sparse irregular net-work. Exceptionally the apical portion is nearly entire, being simply perforated with three or four oval or rounded openings.

Spores 8  $\mu$ . in diameter, dark violet-red color in mass, but pale red under the microscope, episporos thick, delicately but clearly warted, though apparently smooth under medium powers.

Fairmount Park, Philadelphia, Adirondack Mts., N. Y. and Manhattan, Kansas (W. T. Swingle).

This species originates from a deep violet-black plasmodium. As usually found, it is diminutive, rivalling *Cribraria microscopica* B. & C. Its marked characters are its color, its proportionally large receptacle and its large delicately spinulose spores which are not exceeded or probably equalled in size by those of any recorded *Cribraria*.

***Cribraria languescens*.**

Sporangia scattered, drooping, spherical .25 to .35 mm. in diameter. Receptacle about one-third of the periphery of the sporangium, red-brown, shining, minutely striate with granular lines, serrated more or less regularly about the margin.

Net-work red-brown, composed of simple threads with polygonal knots, having usually five or six angles and straight or only slightly concave sides, forming more or less triangular interspaces at the intersections. Stipes about 2.5 to 3 mm. high, slender, subulate, dark red-brown, somewhat sinuous or wavy, longitudinally rugose. Spores when recent, dull red in mass, becoming paler in time, averaging 6  $\mu$ . in diameter.

Shawangunk and Adirondack Mts., N. Y.

The excessive variability which characterizes the genus *Cribraria* is especially shown by the group of species having net-works with angular knots at the intersections. The type species of Schrader have served their purpose so well for nearly a century that all later monographers have continued them without question and with few additions to their numbers. There is, however, in American specimens at least, a steady and well marked intergradation between these central types, evolving an infinite number of variations which serve to confuse and perplex the student.

There are also many intermediate types, some of which are quite as constant and possess quite as marked an individuality as the Schraderian types, which cannot legitimately be referred to them even as varieties. The species just described may be cited as an example. I have found specimens of it several years apart, growing in widely different habitats and yet the specific characters are constant in all cases. In its scattered and solitary growth, its tall slender stipes and relaxed habit, it resembles *C. microcarpa*, in its net-work it approaches *C. tenella*, and its spores have the color of the paler forms of *C. purpurea*.

With all of these resemblances, however, it has a marked individuality.

**Trichia Andersoni.**

Sporangia sessile, closely aggregated in clusters, globose, flattened, sometimes a little elongated, usually .4–.5 mm. in diameter. Walls of sporangia sometimes roughened or corrugated showing under the lens fine lines or striæ radiating from local centers. Color of the unbroken sporangia dark olivaceous.

Capillitium composed of cylindrical elaters of a deep orange yellow color, 3.75  $\mu$ . in diameter, provided with four spirals winding evenly and closely, without or with very narrow interspaces.

Ends of elaters tapering, 18  $\mu$ . long, the outer half being smooth or free from spirals. Spores greenish-yellow or olivaceous 11–12  $\mu$ . in diameter, delicately spinulose, but apparently smooth under medium power lenses.

Sand Couleé, Montana, F. W. Anderson.

This *Trichia* presents a strong contrast between its olivaceous spores and its deep orange capillitium. It differs from the *Trichia chrysosperma* group of sessile aggregate Trichias, in the absence of interspiral or longitudinal filaments.

**Hemiarocyria obscura.**

Sporangia sessile, scattered, globose, or elongated globose slightly curved, dusky or brownish-red in color, inconspicuous, .4 to 1 mm. in length by about .4 mm. in width.

Capillitium of a dull brick red color, composed of a sparingly branched, loose meshed net-work with few or no free ends. Tubes of capillitium slender, uniform, without expansions, 2.5 mm. in diameter, provided with seven or eight spirals winding evenly with narrow interspaces, faint and inconspicuous under medium power lenses.



Spores 10–10.5  $\mu$ . delicately warted and of a pale lemon-yellow color.

Sand Couleé, Montana, F. W. Anderson.

The noteworthy features in this *Hemiarcyria* are the slender and faintly marked capillitium and the strong contrast in color, as in the preceding species, between the spores and capillitium.

***Hemiarcyria longifila*.**

Sporangia simple, stipitate, erect, golden-yellow in color, globose-turbinate or pyriform, rupturing irregularly at the top leaving a short funnel-shaped receptacle. Sporangium wall thin, translucent, shining. Height of sporangium, including stipe, averaging 1.3 mm. Stipes dark red-brown, longitudinally rugose. Capillitium composed usually of single long threads, not branched or very sparingly branched. These threads are doubled in their course into a succession of loops which are usually twisted upon themselves, the whole expanding upon the rupture of the sporangium wall into an elongated tangled mass.

Tubes of capillitium 3.5–4  $\mu$ . in diameter, provided usually with four spirals sparsely spinulose with short, sharp spines, winding evenly and regularly and separated by wide interspaces two or three times their width; adjoining spirals connected by conspicuous longitudinal filaments.

Capillitium and spores concolorous, being orange-yellow in mass.

Spores delicately warted, 9–10  $\mu$ . in diameter.

Fairmount Park, Philadelphia.

Externally this species resembles *Hemiarcyria clavata* Pers. and has probably often been mistaken for it. The capillitium, however, in its structural details and habit of growth is widely different. The partial untwisting of the loops of the capillitium by drying, after the rupture of the sporangium, causes it to be projected and elongated, sometimes two or three times the length of the sporangium. In this particular it resembles *Hemiarcyria rubiformis*, but the mass of capillitium is not nearly so dense.

***Hemiarcyria Varneyi*.**

Sporangia stipitate, erect, elongated ovate, about 1 mm. high including stipes. Sporangium wall evanescent above, breaking away at maturity leaving a shallow cup-like receptacle at the base.

Stipes short, .2 mm. or less in height, dull brown. Capillitium dull ochre, attached to the center of the receptacle, elongated, form-

ing a closely meshed reticulation, having numerous short, slightly clavate free ends which proceed from the peripheral meshes.

Tubes of capillitium  $3.2-3.5 \mu$ . wide, provided with seven or eight spirals winding unevenly with interspaces averaging the width of a spiral. The free ends and the external loops of the capillitium from which they proceed, spinulose with short, blunt spines attached to the spirals. Spores  $6.25 \mu$ . in diameter, pale, smooth.

Kansas, Miss May Varney (com. W. T. Swingle).

This species must be referred to the comprehensive genus *Hemiarcyria* by reason of the spiral structure of its capillitium; in all other respects, it resembles the genus *Arcyria* and would unhesitatingly be referred to it, without a microscopic examination of the threads. The habit of growth of the sporangium with its evanescent upper wall and permanent saucer-like base, the close mesh of the capillitium net, and the small, smooth, thin walled spores are all characteristic of the genus *Arcyria*.

Together with the neighboring American species *Hemiarcyria stipata* Swz. which has an analogous structure, it properly forms a separate subsection of the genus.

#### DIANEMA Nov. Gen.

Sporangia simple or plasmodiocarpous with membranaceous non-calcareous walls.

Capillitium composed of threads without characteristic thickenings, running entirely across the sporangium, attached both to the base and to the opposite wall, and not joined together to form a net-work.

##### *Dianema Harveyi*.

Sporangia sessile, generally rounded or cushion-shaped, flattened above, averaging about 1 mm. in diameter, 35 mm. in height, sometimes elongated and bent into an irregular horse-shoe-shape, color gold bronze, with a metallic lustre. Sporangium walls membranaceous, thin, translucent, containing no trace of lime, rupturing irregularly.

Capillitium and spores concolorous, being brownish-yellow in mass.

Capillitium composed of numerous slender threads from  $1.5$  to  $2 \mu$ . in diameter, not connected with each other, simple, without free branches but often forked two or three times near their origin or insertion, nearly parallel, taut, running from base to the top of the sporangium. Spores  $8 \mu$ . in diameter, pale yellow under a micro-

scope, delicately spinulose, but apparently smooth under medium power lenses.

Orono, Maine, F. L. Harvey.

This is in some respects an anomalous genus which it is difficult to classify satisfactorily. In the structural relation of the capillitium to the sporangium walls, it is analogous to the sessile species of the Didymiaceæ, but it lacks the violaceous colored spores and the calcareous external walls characteristic of that family.

It is most nearly allied to the Perichænaceæ by reason of the color of its spores and its simple unmarked capillitium, but cannot correctly be classified with that family, at least in the classification of recent monographers without some modification of their definition of the family limitations.

At present it stands as a single representative of a new and separate family adjoining the Perichænaceæ in the order Calonemæ Rost.

It has been deemed advisable in the present paper, to specify approximately the amplification used in the foregoing descriptions of the sculpturing of the spores and capillitium of the species represented, in order to prevent errors in determination.

By medium power lenses, therefore, such lenses are meant as the one-quarter or one-fifth inch objectives in common use, which will give an amplification with a one inch ocular, of from 400 to 500 diameters.